

PREDATION BY THE LARVAE OF LECONTELLA
CANCELLATA (LECONTE) (COLEOPTERA: CLERIDAE) ON
SEVEN SPECIES OF ACULEATE HYMENOPTERA^{1,2}

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According to Balduf's records (1935), most clerid larvae feed on species of wood-infesting beetles. However, the larvae of several species of the clerid genus, *Trichodes*, prey on wasp and bee larvae as well as their stored provisions (Linsley, 1944). Two previous observations are recorded of the feeding habits of the larvae of *Leconteella cancellata* (LeC.). Knull (1932) reported that he reared an adult beetle from a larva collected from the nest of a bee under the loose bark of a log. Rau (1944) found two dead *L. cancellata* adults and a larva in the cells of a nest of the mud dauber wasp *Sceliphron caementarium* (Drury). Rau found the beetle larva in an unbroken cell. Krombein (1967) reported *Trichodes horni* Wolcott and Chapman from two nests of megachilid bees. He also reported unidentified clerid larvae from eleven other nests of at least eight species of wasps and bees.

This paper further contributes to the very little knowledge of Cleridae in the nests of solitary wasps and bees.

In a trap-nest study during the summer of 1969 on the Black Rock

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Farm near Lafayette, Indiana, 31 larvae of *L. cancellata* were found in 28 artificial nesting sites (trap-nests) which were occupied by several species of aculeate Hymenoptera. The trap-nests used in this study consisted of two 20 × 305 × 305 mm yellow-pine boards nailed together with holes drilled to a depth of 127 mm between the interface. Four holes were drilled in each of 64 sets of boards. Each set had the following sizes: 4/16 inch (6.4 mm), 5/16 inch (7.9 mm), 6/16 inch (9.5 mm), 7/16 inch (11.1 mm). Half of the trap-nests were positioned in each of two separated barns. One of the test barns was surrounded by pasture and was located near several other farm buildings. The second test barn was located in a meadow surrounded by woodlands about 0.5 mile (.805 km) from the first site. There were no other buildings near by. The trees of the woodland were mostly oak and hickory, while crabapple was the dominant meadow species. Equal numbers of the trap-nests were placed horizontally on support beams at four heights ranging from 3 to 12 feet (.914m to 3.66m) from the floor of the barn on both the east and west sides of the barn. They were placed in position the last week in April and removed the last week in September.

Nine species of Hymenoptera accepted the artificial nesting sites. The same species were found at both sites; however, the number of holes utilized by each species differed with the site. While larvae of *L. cancellata* were found in the nests of seven species, they were found only in nests at the woodland site. The host species, number of larvae and number of borings occupied by *L. cancellata* are given in Table 1.

TABLE 1. Number and occurrence of *Lecontella cancellata* (LeC.) in the nests of seven species of wasps and bees.

Host	Number of Larvae	Number of Holes Occupied
Vespidae		
<i>Monobia quadridens</i> (L.)	3	3
Sphécidae		
<i>Trypargilum striatum</i> (Prov.)	5	5
<i>T. clavatum</i> (Say)	1	1
<i>Isodontia auripes</i> (Fernald)	1	1
Megachilidae		
<i>Osmia lignaria</i> Say	14	11
<i>O. coeruleus</i> (L.)	1	1
<i>Megachile</i> sp.	6	5

The method by which the larvae of *Lecontella* gained access to the cell of the host bee or wasp was not determined. The clerid larvae were never observed feeding on hymenopteran larvae, but they left evidence indicating predatory behavior. The clerid larvae were found in empty, opened and unopened cocoons and were found in single unbroken cells of nests and also in cells with partitions broken open. The clerid larvae were observed in cells with only parts of wasp and bee larvae and pupae present. Most of the Hymenoptera made nest partitions between the cells with mud and the beetle larvae in most cases did not chew through more than one partition. In several cases the beetle larvae destroyed the entire length of the *Megachile* sp. nests which made partitions from leaf parts.

The numbers of beetle larvae found by hole size and by vertical placement are given in Table 2. Interaction between hole size and

TABLE 2. Number and occurrence of *Lecontella cancellata* (LeC.) by hole size and by vertical placement of trap nests.

Hole Size	Number of Larvae Present	Vertical Placement	Number of Larvae Present
4/16 in (6.4mm)	10	3 ft (.91m)	2
5/16 in (7.9mm)	11	6 ft (1.8m)	8
6/16 in (9.5mm)	5	9 ft (2.7m)	15
7/16 in (11.1mm)	5	12 ft (3.6m)	6

vertical placement did not appear to be significant. Seventy percent of the beetle larvae were found in the traps on the posts located nearest the ends of the east and west sides of the barn. These areas corresponded to the areas where the traps were most accepted by the wasps and bees.

The beetle larvae were collected from the nests during October, placed in individual bored-out yellow-pine blocks (20 × 20 × 152 mm) and set in plastic boxes. The larvae were kept at room temperature (21 ± 2°C) and no water or food sources were provided. The larval mortality rate was high. In February small dust piles were noticed in the boxes. Closer observation revealed that the larvae had chewed small tunnels into the sides of the wood blocks in order to pupate. Seven adults emerged in March and were identified by D. E. Foster, University of Idaho, as *L. cancellata*.

This study indicates that *L. cancellata* larvae are most likely found

in woodland situations probably feeding on wood-infesting beetle larvae and any hymenopterous larvae encountered. The beetle larvae are not believed to be a regulating factor to hymenopteran populations that nest in pre-existing cavities. However, in a situation such as trap-nesting where large numbers of holes are made available to wasps and bees in a relatively small area, clerid larvae may have important effects. Bees which make cell partitions with leaves, as do *Megachile* spp., may have 100% of the cells in a nest destroyed; whereas, species of wasps and bees which make cell partitions of more resistant material, i.e. mud, may have only one or two cells destroyed per nest.

LITERATURE CITED

- BALDUF, W. V. 1935. The Family Cleridae, p. 107-111, In. W. V. Balduf, The Bionomics of Entomophagus Coleoptera. J. S. Swift Co. Chicago.
- BITNER, R. M. 1970. The population structure of coexisting species of wasps and bees. M. S. Thesis at Purdue University. 120 pages.
- KNULL, J. N. 1932. Notes on Coleoptera-No. 3. Ent. News. 43: 42.
- KROMBEIN, K. V. 1967. Trap-nesting wasps and bees: life histories, nests, and associates. Washington: Smithsonian Press, vi+570 p.

2.0135 Predation by the larvae of *Lecontella cancellata* (LeConte) (Coleoptera: Cleridae) on seven species of Aculeate Hymenoptera.

ABSTRACT.—Trap-nest studies in Indiana indicate that *Lecontella cancellata* (Coleoptera: Cleridae) larvae are most likely found in woodland situations probably feeding on wood-infesting beetle larvae and any hymenopterous larvae encountered.—RON M. BITNER, Department of Zoology, Utah State University, Logan, UT 84321.

Descriptors: Coleoptera; Cleridae; *Lecontella cancellata*, larvae, predators; Hymenoptera; Vespidae; Sphecidae; Megachilidae; predation on aculeate Hymenoptera.